Bird and Bat Monitoring Plan

Woolnorth Bluff Point Wind Farm and Woolnorth Studland Bay Wind Farm

Prepared in accordance with Permit Condition WG4 issued under the *Environmental Management and Pollution Control Act 1994* and Condition 3(b) issued under the *Environment Protection and Biodiversity Conservation Act 1999*

Prepared By: Environmental Services

HYDRO ELECTRIC CORPORATION
ARBN 072 377 158
ABN 48 072 377 158
4 Elizabeth Street, Hobart
Tasmania, Australia

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Definitions

1.1 Unless the context requires otherwise, words and phrases used in this Bird and Bat Monitoring Plan (the "Monitoring Plan") have the meaning set out in the Permit Conditions for the activity required by the Director.

1.2 The following definitions apply unless the context requires otherwise:

"The Activity" means the development and operation of the windfarm;

"Woolnorth Bluff Point Wind Farm" means Lot 1 of the Woolnorth Wind Farm as defined in the Development Proposal and Environmental Management Plan (GD-0369-DA-01 Rev 03 – 24 July 2000) and will be owned and operated by Woolnorth Bluff Point Wind Farm Pty Ltd.

"Woolnorth Studland Bay Wind Farm" means Lot 2 of the Woolnorth Wind Farm as defined in the Development Proposal and Environmental Management Plan (GD-0369-DA-01 Rev 03 – 24 July 2000) and will be owned and operated by Woolnorth Studland Bay Wind Farm Pty Ltd.

"Director" means the Director of Environmental Management;

"DPIWE" means the Department of Primary Industries, Water and the Environment;

"Minister" means the Minister for the time being administering the *Environment Protection and Biodiversity Conservation Act 1999*;

"DEH" means the Commonwealth Department of Heritage;

"Hydro Tasmania" means the Hydro-Electric Corporation (ARBN 072 377 158);

"wind turbine" means a horizontal axis wind turbine mounted on a tubular steel tower, as illustrated in Figure 9 of the DPEMP.

1.3 The survey periods for Woolnorth Bluff Point Wind Farm and Woolnorth Studland Bay Wind Farm are defined as:

- Orange-bellied Parrot Autumn peak period (early March to mid May)
- Orange-bellied Parrot Spring peak period (mid September to mid November)
- Orange-bellied Parrot off-peak period (mid May to 30 June)
- Eagle display period (1 June to 31 August), and
- Eagle fledgling period (15 November to 1 March).

1.4 The EPBC definition for Orange-bellied Parrot migration generally is:

- autumn migration from 1 March to 30 June; and
- spring migration from 1 September to 30 November.

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1 Background

Hydro Tasmania has created two subsidiary companies, Woolnorth Bluff Point Wind Farm Pty Ltd (Lot 1) and Woolnorth Studland Bay Wind Farm Pty Ltd (Lot 2) as the asset owners and managers of the two wind farm sites previously referred to as Woolnorth Lot 1 and Woolnorth Lot 2.

This plan details the bird and bat monitoring to be undertaken on each wind farm site and clearly delineates each subsidiary company's ongoing responsibilities.

All surveys detailed below will be conducted by experienced observers who have previous involvement with monitoring at the sites, or will be approved by the relevant members of the Department of Primary Industries, Water and Environment.

2 Surveys During Construction

2.1 BLUFF POINT WIND FARM

Post-commissioning bird utilisation surveys of the Bluff Point Wind Farm will continue as normal (detailed in Section 3).

2.2 STUDLAND BAY WIND FARM

No bird utilisation surveys will be undertaken during the construction period of the Studland Bay Wind Farm due to Occupational Health and Safety reasons, and because the data collected during this period are unlikely to be representative, due to the disturbance effect on birds. However, the construction site will be checked daily during the construction period to determine if any birds have collided with partially or fully erected towers.

Roaming surveys on site will be undertaken during construction of the Studland Bay Wind farm, where possible[1].

[1] The main factor in determining whether to proceed with roaming surveys on Woolnorth Studland Bay will be the extent of construction occurring and the potential risks to the occupational health and safety of both Construction personnel as well as personnel undertaking the survey.

3 Surveys Post-Commissioning of the Wind Farms

3.1 BIRD UTILISATION SURVEYS

3.1.1 Bluff Point Wind Farm and Studland Bay Wind Farm

Surveys will be undertaken on the two transects at each wind farm as used during pre-commissioning surveys (as detailed in the approved Bird and Bat Monitoring Plan, Woolnorth Wind Farm Stage 2). These surveys will continue for three years post-commissioning and will then be subject to review and agreement with DEH and DPIWE.

All birds observed will be noted, with particular emphasis placed on the following:

- Orange-bellied Parrot
- Wedge-tailed Eagle
- White-bellied Sea-Eagle
- Ruddy Turnstone
- Latham's Snipe
- Eastern Curlew
- Double-banded Plover
- Grey Plover
- Pacific Golden Plover
- Red-necked Stint
- Curlew Sandpiper.

Avian risk models will be updated at the end of each year. Surveys will be either on foot or by using slow moving motorbikes. Bird utilisation surveys will be conducted during the peak Orange-bellied Parrot migration periods. A minimum of ten (10) replicates on each transect will be obtained each season, each year. The remaining methodology is outlined in *"Technical Report: Avian Studies West Coast Wind Farm"*, prepared by Hydro Tasmania 27 February 2001.

3.2 MANAGEMENT OF ORANGE-BELLIED PARROT HABITAT PLOTS

3.2.1 Bluff Point Wind Farm and Studland Bay Wind Farm

In accordance with the Vegetation Management Plan, and as part of the clarification of each subsidiary company's ongoing responsibilities, it is intended to allocate the management of one half of the co-located habitat plot to Woolnorth Bluff Point Wind Farm Pty Ltd and the other to Woolnorth Studland Bay Wind Farm Pty Ltd.

3.3 WIND MONITORING TOWERS - BIRD STRIKE SURVEYS

3.3.1 Bluff Point Wind Farm and Studland Bay Wind Farm

Monitoring of bird collisions at the wind monitoring towers (the northern tower at the Bluff Point Wind Farm and the two towers planned for the Studland Bay Wind Farm) will be conducted during the same periods and frequency as that for the wind turbines (Section 3.4), for a period of two years from the fencing of the tower, and will then be reviewed in consultation with DPIWE and DEH. Fencing at the Bluff Point tower was completed in February 2004.

Where new or relocated wind monitoring towers are proposed, the towers will be surveyed for bird strikes for a period of two years from commissioning of the tower.

Methods

- Searches will be conducted twice weekly (not on consecutive days) for 7 weeks during autumn (in order to monitor during peak bird movements); twice weekly during the eagle fledging period; and once per fortnight for the remainder of the year (for raptors) for evidence of dead birds.
- The search area will have a radius of 50m from the base of the tower, except where this area falls outside of the existing cleared areas, subject to the agreement of DPIWE and DEH.
- The search area will be fenced, and the fence will be inspected and repaired (if necessary) during each monitoring event.
- Searches will be undertaken either on foot and/or by using slow moving motorbikes.
- All parts of the dead bird will be collected for possible identification and if required, referred to DPIWE.
- Any carcasses found will be investigated for the probable cause of mortality and reported within 24 hours to the Director if a native species. If the carcass is a non-native species then this will be reported in the annual report to the Director and DEH. Refer Section 4.0 Reporting.
- All native bird or bat carcasses will be retained for a minimum of one month, unless DPIWE advises carcasses can be disposed of earlier.
- The reporting details will include results, analysis and interpretation of results, conclusions and subsequent management actions.

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3.4 MONITORING OF BIRD AND BAT COLLISIONS WITH WIND TURBINES

3.4.1 Bluff Point Wind Farm

The purpose of the monitoring on site is to validate the collision risk model predictions for all species (where possible), with particular emphasis on raptors.

Methods

Turbines to be monitored
The turbines AB, AD, AE, AF, BD, BA, CG, DJ, EH and EA will be monitored.

Turbines are fenced.

Survey frequency
The turbines selected will be monitored once per fortnight for raptors and all other species, all year round. Monitoring for all species will also occur twice weekly for 7 weeks (not on consecutive days) during autumn (in order to monitor during peak bird movements), and twice weekly during the eagle fledging period.

Sampling strategy

- Searches will be undertaken either on foot and/or by using slow moving motorbikes.
- The search area will have a 100m radius from the base of each turbine, except where this area falls outside the existing cleared areas, using the same techniques as have been used at Bluff Point. Any variation to the search strategy will be submitted to DPIWE and DEH for approval.
- The fence(s) will be inspected and repaired (if necessary) during each monitoring event.
- If there is evidence of non-avian carcass predation or presence of a non-avian predator within the enclosure, a trapping program will be conducted.
- All parts of any dead bird or bat will be collected for possible future analysis, and if required, referred to DPIWE.
- Any carcasses found will be investigated for the probable cause of mortality and reported within 24 hours to DPIWE if a native species. If the carcass is a non-native species then this will be reported in the annual report to DPIWE. Refer Section 4.0 Reporting.
- All native bird or bat carcasses will be retained for a minimum of one month, unless the DPIWE advises carcasses can be disposed of earlier.
- The reporting details will include results, analysis and interpretation of results, conclusions and subsequent management actions.

Duration of monitoring
The monitoring will be undertaken for two years post-commissioning of the last Stage 2 turbine. The program will then be reviewed and agreed with the Director and DEH.

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3.4.2 Studland Bay Wind Farm

The purpose of the monitoring on site is to validate the collision risk model predictions for all species (where possible), with particular emphasis on raptors.

The following table lists the turbines Studland Bay Wind Farm propose to monitor at Studland Bay. Discussion with Glenn McPherson and information on raptor and OBP sightings across the site provided by Simon Plowright has been used as the basis for this program. Criteria for selecting the turbines are:

- Proximity to the WBS Eagle nest on site
- Proximity to known raptor (WBSE and WTE) flight paths
- Proximity to sightings of *Neophemas*
- Ability to be monitored for bird strike – at least to 50 m but more likely 100 m from turbine base

- Apparent ease of establishing predator-proof fencing around the turbine

Turbines to be monitored, in order of priority

Turbine number	Factors considered
3	Proximity to WTE flight path, easily fenced for survey work
7	Proximity to WTE and WBSE flight path, easily fenced (may be some minor overlap of survey area with native vegetation remnant)
9	Proximity to WTE flight path and WBSE nest, easily fenced (may be some overlap of survey area with native vegetation remnant)
18	Proximity to WBSE flight path and nest, easily fenced
12	Proximity to known WTE flight path, easily fenced
24	Proximity to possible *Neophema* usage area, easily fenced (may be some overlap of survey area with native vegetation remnant)

Note that the ability to monitor an area at least 50 m from the turbine base is required. Turbines with remnant vegetation nearby cannot be adequately monitored because the vegetation cannot be removed. Where possible turbines have been located at least 50m from remnant vegetation.

Methods

Turbines to be monitored
A minimum of seven turbines will be monitored and the turbines to be monitored will be selected in consultation with DPIWE based on:

- proximity to raptor flight paths;
- observations of *Neophema* activity collected during bird utilisation surveys; and
- proximity to the Sea-eagle nest.

Turbines will be fenced with a predator proof fence (as used at the Bluff Point Wind Farm) and fencing around monitored turbines will either be in groups or singularly, depending on which is the most practical.

Survey frequency
The turbines selected will be monitored once per fortnight for raptors and all other species, all year round. Monitoring for all species will also occur twice weekly for 7 weeks (not on consecutive days) during autumn (in order to monitor during peak bird movements), and twice weekly during the eagle fledging period.

Sampling strategy

- Searches will be undertaken either on foot and/or by using slow moving motorbikes.
- The search area will have a 100m radius from the base of each turbine, except where this area falls outside the existing cleared areas, using the same techniques as have been used at Bluff Point. Any variation to the search strategy will be submitted to DPIWE and DEH for approval.
- The fence(s) will be inspected and repaired (if necessary) during each monitoring event.

- If there is evidence of non-avian carcass predation or presence of a non-avian predator within the enclosure, a trapping program will be conducted.
- All parts of any dead bird or bat will be collected for possible future analysis, and if required, referred to DPIWE.
- Any carcasses found will be investigated for the probable cause of mortality and reported within 24 hours to DPIWE if a native species. If the carcass is a non-native species then this will be reported in the annual report to DPIWE. Refer Section 4.0 Reporting.
- All native bird or bat carcasses will be retained for a minimum of one month, unless the DPIWE advises carcasses can be disposed of earlier.
- The reporting details will include results, analysis and interpretation of results, conclusions and subsequent management actions.

Duration of monitoring
The monitoring will be undertaken for two years post-commissioning of the last turbine on site. The program will then be reviewed and agreed with the Director and DEH.

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3.5 BREEDING SUCCESS OF WEDGE-TAILED AND WHITE-BELLIED SEA-EAGLES

3.5.1 Bluff Point Wind Farm and Studland Bay Wind Farm

The breeding success (that is, the number of young that survive to just prior to fledging or productivity) of any Wedge-tailed Eagle and White-bellied Sea-Eagle nests identified on site will continue to be monitored each year for a period of three years, from commissioning of Woolnorth Stage 2 (August 2004). The program will then be reviewed in consultation with DEH and the Director.

Additional to the nests on site, Bluff Point Wind Farm and Studland Bay Wind Farm will undertake surveys of the identified nests on the greater Woolnorth property, for an assessment of their productivity as listed in Attachment A, Table 1.

One survey will be conducted during early September (incubation) and the second in late November/early December (close to fledging).

Monitoring and reporting will be conducted in accordance with the *Protocol to Assess Adverse Impacts on the Breeding Success of Eagles* (Attachment B). A combination of observational and breeding success data will be collected to assess potential impacts on breeding eagles.

Surveys will be conducted by an experienced bird observer.

The results from the eagle breeding success surveys will be reported in the annual report. The reporting details will include results, analysis and interpretation of results, conclusions and subsequent management actions.

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3.6 EAGLE STUDIES

3.6.1 Behavioural observations of eagles around wind turbines

Bluff Point Wind Farm

The objectives of this study are to:

1. Assess the behaviour of birds in the observation area of a turbine to determine the extent of avoidance of the individual turbines;
2. Assess whether the ability to avoid turbines is affected by weather conditions; and
3. Assess the variation of avoidance between species.

The primary survey involves the following. (Refer to *"Pilot survey – behaviour of birds around turbines" Hydro Tasmania, January 2005*).

- Surveys are conducted during the eagle fledging period in summer (December) and the eagle display period in winter;
- Turbines AA, AF, ED, EH, EA, CC and CG are monitored, with emphasis on E circuit.

The primary survey will commence following the operation of the first turbine of Stage 2 and will continue for 2 years after the commissioning of all Stage 2 turbines. The program will then be subject to review with DEH and the Director.

Persons undertaking the surveys will be experienced observers.

If an incident occurs during this study, then the incident will be reported as required in Section 4.0, Reporting.

The results of the surveys will be provided in the annual report.

3.6.2 Turnover rates

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Bluff Point Wind Farm and Studland Bay Wind Farm

The objectives of this study are to examine:

- What eagles use the site, including any territorial pairs on site?
- If an eagle dies from whatever cause, does a new bird move on to site?
- What is the age class of the replacement birds?
- How quickly does the replacement bird begin breeding?

Methods

In order to answer these objectives it is necessary to catch and individually mark eagles resident on site. The catching and marking of eagles will proceed, provided the appropriate approvals (Animal Ethics, Tasmanian Threatened Species Permit, Australian Bird and Bat Banding Scheme and DEH) are received.

Please note that a moratorium has been placed, by DEH, on banding and attachment of devices on White bellied Sea eagles. An alternate proposal will be submitted to both DEH and DPIWE in the near future.

Trapping program
Eagles will be caught using the most appropriate and safe trap available, baited with freshly killed rabbits or similar. Eagles will be measured, weighted and banded in accordance with the Australian Bird and Bat Banding Scheme. Eagles will also be individually marked with patagial tags. If Bluff Point and Studland Bay are provided with evidence that these will have an impact on the eagles, consultation will be undertaken with DEH and the Director.

A trapping period of eight (8) weeks will be conducted on site, including around the boundaries, during the most appropriate times of the year (that is, the times when the least amount of disturbance to eagles is likely, eg post breeding). The objective will be to trap and mark as many of the nesting eagles on the site as can practicably and safely be achieved during the 8 week trapping period. During the trapping program, observations of eagles will be undertaken to identify the number of birds utilising the site.

If the eagle trapping objective is not achieved, an alternative will be considered in consultation with DPIWE and DEH and any alternative proposed must be approved by DPIWE and DEH.

An experienced bird observer with a Class A banding licence and experience trapping eagles will undertake the trapping.

If eagle turnover occurs during the study period, further trapping will be required.

Monitoring program
Following the banding of eagles, it is anticipated that observations of these birds will be conducted for a period of 2 days per month.

The observation periods and methodologies will be further defined following a review of the success of the trapping program and review with approval by DPIWE and DEH.

Personnel conducting the monitoring will be experienced.

The study will commence in the first non-breeding period following operation of the first Stage 2 turbine and will continue for three years post commissioning of all Stage 2 turbines. The program will then be reviewed in consultation with the Director and DEH.

The results of the trapping program will be reported to DPIWE and DEH following completion of the 8 week trapping program with the results of the monitoring program reported in the annual report. The reporting details will include results, analysis and interpretation of results, conclusions and subsequent management actions.

In the event of an eagle mortality, management actions will be developed and agreed in consultation with DPIWE and DEH. These should include but will not be limited to:

- Identification of the location of the nest which the deceased eagle was using, if the bird was a breeding adult;
- Monitoring the impact to any chick(s) if present, and develop management measures to maximise survival success;

- Monitoring the remaining parent bird on a monthly basis to determine if/when a replacement bird is acquired, until the next breeding attempt;
- Monitoring the affected nest and/or the affected surviving parent bird each breeding season until the next breeding attempt;
- Note any changes to the activities and site utilisation of the neighbouring eagles during the period prior to acquisition of a replacement bird; and
- Report on the implications of the mortality with respect to the predictions of the collision risk model.

4 Reporting

Bluff Point Wind Farm Pty and Studland Bay Wind Farm Pty Ltd will report separately to the Director and the Department of Environment and Heritage once per year. Each report will contain the results of the following surveys and monitoring (including methodologies used, results, analysis and interpretation of results and subsequent management actions):

- Bird utilisation surveys;
- Monitoring of Orange-bellied Parrot crops;
- Wind monitoring towers – bird strike surveys;
- Monitoring of bird and bat collisions with wind turbines;
- Eagle breeding success; and
- Eagle studies, including behavioural observations around wind turbines and turnover rates.

The annual report will also include:

- graphical and/or tabular summary of bird and/or bat collisions for the year, including comparisons with previous years data and collision risk modelling;
- details of inspection and maintenance activities for the predator proof fence;
- cumulative collision rates for turbines monitored; and
- standardised operating hours for turbines monitored.

Bird Collision Reporting

The Director will be notified of the detection of evidence of a native bird or bat collision within 24 hours, including the results of roaming and opportunistic identifications. Notification will include a brief description of evidence, detection location and other relevant information. The notification will be either faxed to (03) 6233 3800 or e-mailed to the nominated DPIWE project officer. Evidence of non-native species will be reported in the annual report.

A bird/bat strike report form will be submitted to DPIWE within 3 days of a notified collision. A photograph of the carcass will also be provided.

Where an autopsy is undertaken, the pathology report will be submitted to DPIWE within 2 days of receipt by Bluff Point or Studland Bay. This will be accompanied by the bird/bat strike report form.

The incident notification, bird/bat strike report form and pathology report will be linked with a unique identification.

5 Reviews

Bluff Point Wind Farm Pty Ltd and Studland Bay Wind Farm Pty Ltd may in their absolute discretion, undertake a review of this plan at any time. Accordingly, this plan may be amended with the approval of the Minister and the Director.

Attachment A

Wedge-tailed Eagle and White-bellied Sea Eagle nest locations on the VDL Property (Woolnorth)

Table 1 - Eagle nests within the Woolnorth property boundary (updated following surveys by Simon Plowright 1 September 2005)

Species	Nest ID	Easting AMG	Northing AMG	Location	GR verification	Status	Comments	Responsibility
wte	**66**	309177	5491655	Shoal Inlet/ Salt Creek	GPS ground	Active	monitor	Bluff Point Wind Farm Pty Ltd
wbse	**67**	320378	5486712	Denium Hill		Active	monitor	Studland Bay Wind Farm Pty Ltd
wbse	**823**	307255	5482240	Studland Bay (Lot 2)	GR verified	Active	monitor	Studland Bay Wind Farm Pty Ltd
wbse	**856**	308846	5495095	Shell Inlets N	GPS ground	Deserted	This nest was last used 12-15 years ago and has essentially been destroyed.	N/A
wbse	**857**	308859	5495079	Shell Inlets S (Shell Point)	GPS ground	Not clear	HT to monitor. This nest has been heavily disturbed, with a new track near the nest.	Studland Bay Wind Farm Pty Ltd
wbse	**1259**	308158	5473227	Mt Cameron West	GPS ground	Active	monitor	Bluff Point Wind Farm Pty Ltd
wte	**522**	306788	5487857	Flat Topped Bluff (South Lot 1)	GPS ground	Active	monitor	Bluff Point Wind Farm Pty Ltd
wte	**681**	314692	5487913	Swan Creek	GPS ground	Deserted	This nest was last used about 8 years ago and is barely recognisable as a nest.	N/A
wte	**854**	306113	5491260	Woolnorth (North Lot 1)	GPS ground	Active	monitor	Bluff Point Wind Farm Pty Ltd
wte	**940**	306988	5495018	Victory Hill 1.5km E Rock Bush)	GPS ground	Active	monitor	Bluff Point Wind Farm Pty Ltd
wte	**941**	310467	5485527	Welcome Bridge	GPS ground	Active (old nest was blown down in a wind	monitor	Studland Bay Wind Farm Pty Ltd

						during 2005, this is the new nest used by the same pair)		
wte	**942**	314194	5480753	Welcome River 4.5km S of Welcome Inlet (Holding Yard)	GPS ground	Active	monitor	Studland Bay Wind Farm Pty Ltd
wte	**943**	310403	5483031	Welcome River 3.5km wNW of Harcus Hill	GPS ground	Deserted	This nest has not been years for over 10 years and has essentially been destroyed.	N/A
wte	**944**	309120	5475050	Mt Cameron West 2.5km W	GPS ground	Deserted	The area around Mt. Cameron West where 944 was thought to be was searched extensively over several days by Simon Plowright,but nothing was found.	N/A
wte	**945**	317500	5486400	Harcus River inlet	GPS ground	Active (located 2005)	monitor	Studland Bay Wind Farm Pty Ltd
wbse	**?**	311160	5489045	Welcome inlet	GPS ground	Active	monitor	Bluff Point Wind Farm Pty Ltd

wte = Wedge-tailed Eagle, wbse = White-bellied Sea-Eagle

Attachment B

Protocol to Assess Adverse Impacts on the Breeding Success of Eagles

Protocol to Assess Adverse Impacts on the Breeding Success of Eagles

Introduction

This document provides the background to eagle breeding success and the considerations that need to be taken into account when developing a monitoring programme to measure breeding success of eagles. This procedure must be followed by proponents intending to conduct 'activities' in Tasmania that may potentially impact on Wedge-tailed Eagles and White-bellied Sea-eagles.

Rationale

The Wedge-tailed Eagle *Aquila audax fleayi* is listed as Endangered under the Tasmanian *Threatened Species Protection Act, 1995* (TSPA). The White-bellied Sea-eagle (*Haliaeetus leucogaster*) is a species of high conservation value in Tasmania. It is currently being considered by the Scientific Advisory Committee for listing under the TSPA.

Eagles are known to be sensitive to disturbances near nests, particularly during the breeding season. Figures 1 and 2 show the fluctuations in sensitivity over a breeding season for the Wedge-tailed Eagle and White-bellied Sea-eagle respectively. Disturbance effects from the construction and operation of an 'activity', such as nest desertion, breeding failure, habitat alienation and displacement of nesting pairs, may result in a compounding of disturbance on the local eagle population.

The extent to which the 'activity' causes such disruption needs to be quantified. A pair of eagles, disrupted from breeding close to the 'activity', may attempt to move and establish a nest further away. This shift in territory centre will impact on the breeding of adjacent pairs, particularly those toward whose nest the move is made. A neighbouring pair, affected by this shift, may also move, placing pressure on their neighbours and thus producing a 'domino effect'. In the event that neighbouring pairs do not move nests, there is likely to be an increase in aggressive encounters between neighbours as a result of a decrease in the separation distances between nests, potentially disrupting or preventing breeding. This impact is equivalent to 'effective loss of habitat'.

This protocol is consistent with the Wedge-tailed Eagle Recovery Plan 1998-2003, which is an approved Recovery Plan. Ratified recovery plans for nationally listed species have received Ministerial approval at the State level (under Division 5 of the TSPA) and at the Commonwealth level (under Division 5, Subdivision A, Sections 269, 269A and 270) of the Environment Protection and Biodiversity Conservation Act 1995)). The recovery plan identifies low breeding success, resulting from disturbance, as one of the main threatening processes. Low breeding success has a number of adverse implications for the population, such as low replacement rates and a reduced number of annual recruits.

This protocol is also consistent with the Threatened Species Strategy 2000 (Parks and Wildlife). The strategy identifies, among the steps for implementation, the need for 'integrating threatened species conservation with State Government, local government and industry planning processes and land management practices', and extending the knowledge base by 'establishing baseline data for monitoring and assessment' and 'investigating gaps in knowledge that will assist in the management of threatened species and threatening processes'.

The Nature Conservation Strategy 2002-2006 states in its Primary Objectives (11 and 12, respectively):

> 'Include mandatory high environmental standards in the accreditation systems for key industries in Tasmania. These standards should include a code of practice with a duty of care component, a certification of product quality and of minimal environmental impact during production, and a third-party audit. Where possible the process should be linked to financial advantages such as an ecolabel or other incentives. (Action 22)'; and
>
> 'Improve the standard of environmental impact assessments and environmental management plans through the provision of revised generic guidelines which include check lists of key nature conservation issues to be assessed and requirements for on-site assessments where appropriate. (Action 12).'

The breeding requirements of the White-bellied Sea-eagle are similar to those of the Wedge-tailed Eagle, though slightly less restricted. The species is also prone to nest disturbance, which may result in breeding failure. It is important to note that the breeding season of the White-bellied Sea-eagle commences about one month earlier than for the Wedge-tailed Eagle, subsequently sensitivity peaks occur earlier (Figure 2). Nesting habitat is limited, and is being impinged upon by coastal land clearance and developments. Proper management requires the protection of all identified nest sites and the control of potentially disturbing activities near nests sites.

Indicators of Adverse Impact

An adverse impact on breeding of eagles in a defined area is indicated by any of the following;

a) The proportion of successful to active Wedge-tailed Eagle territories falls below 0.83. (ie. 12/14). [data from the 2002 Annual Wedge-tailed Eagle Recovery Plan Report to Environment Australia, (WTE ESU13160_6095 PROJECT REPORT April 2002: Table 1.)]

b) The proportion of active Wedge-tailed Eagle territories falls below 0.64, (ie. 9/12). [data calculated from Table 1., Mooney, N and Holdsworth, M., 1991. The Effects of Disturbance on Nesting of Wedge-tailed Eagles (*Aquila audax fleayi*) in Tasmania. Tasforests, Dec. 1991, Vol. 3, pp 15-31.]

c) The average productivity of White-bellied Sea-eagle territories falls below 1.0, [data calculated from Turner & Thurstans, 2000. Conservation Strategy for the White-bellied Sea-eagles in the Tamar Valley Region, Tasmania. Government Printing Authority, Hobart].

d) The occurrence of any eagle mortality, or incapacity preventing breeding, attributable to any wind farm infrastructure or activity.

Definitions

Active nest:	A nest showing signs of refurbishment or attendance by eagles.
Active territory:	A territory containing at least one nest showing signs of refurbishment or attendance by eagles.
Breeding failure:	The failure of an active territory to fledge young.
Successful nest:	A nest from which at least one eaglet is fledged. (Note: Due to the low mortality in eaglets over four weeks of age, observations of eaglets of this age or greater will constitute successful breeding).
Successful territory:	A territory containing one nest from which at least one eaglet is fledged.

Benefits of a monitoring program

The benefits of monitoring breeding success include, but are not limited to:

- improved scientific rigour for assessment of the impact of the 'activity' on the breeding success of eagles;
- assess issues of habitat alienation or displacement of nesting pairs, which can impact on breeding success, through monitoring breeding behaviour at nests on a regional scale;
- increase general knowledge of eagle interactions with the 'activity'.

Requirements

A monitoring program should contain the following general information:

- Location of project (including AMG references and map);
- Extent of monitoring (including maps with nest locations and bounds of survey identified);
- Duration of proposed program.

Nests to be monitored

Nests that are lost through natural attrition should be removed from the program. Any new nests located within the designated area during the program should be added to the program.

Timing of surveys

Surveys shall be conducted once in September and once in November.

Protocols for Nest Activity Assessment

- Persons conducting the surveys must be accredited by the Nature Conservation Branch as having completed Nest Activity Assessment training.
- Surveys may be conducted from the ground or by air.
- A maximum of two people must conduct ground surveys and noise is to be minimised.
- Ground surveys are not to be conducted in wet and/or extreme temperature conditions; ie. in the likelihood of any significant precipitation, or temperatures less than 10°C or greater than 30°C, occurring within 60 minutes of the survey.

- For surveys conducted from the ground, the observer(s) is(are) limited to a maximum of 60 minutes within 200m of the nest, of which a maximum of 20 minutes may be spent within 100m of the nest.
- Persons conducting surveys must not approach closer than 50m from a nest unless the nest is known to be inactive.
- Surveys conducted from the air must be limited to a maximum of three passes over any individual nest.
- The results of the surveys must be recorded on the Eagle Nest Activity Assessment Form (Appendix 1). All sections of the form must be completed.

Reporting and Results

- A summary report of results for each survey period must be submitted to the Nature Conservation Branch, DPIWE, not more than one month after each survey period; ie one month after the September survey and one month after the November survey. The report must include copies of all 'Eagle Nest Activity Assessment Forms' for the reporting period. All sections of the assessment forms must be completed, except the 'NCB Specialist Use Only' section.
- Results of the program must be reported to the Nature Conservation Branch, DPIWE, annually. The report must include a summary of the results for all previous surveys.
- Nest sites are to be marked on photos/maps in reports using the unique established NCB nest identification numbers.
- The standard format of the annual report must be developed in consultation with Nature Conservation Branch, DPIWE. The format must be specified in the plan.

Relevant Literature

2002 Annual Wedge-tailed Eagle Recovery Plan Report to Environment Australia, (WTE ESU13160_6095 PROJECT REPORT April 2002: Table 1

Bell, P. J. & Mooney, N. J. (1998) The Wedge-tailed Eagle Recovery Plan 1998 - 2003. Parks and Wildlife Service, Hobart

Brown, W. E. & Mooney, N. J. (1996). Modelling of the nesting habitat of the Wedge-tailed Eagle (*Aquila audax fleayi*) in Tasmania. Report to the Tasmanian RFA Environment and Heritage Technical Committee

Mooney, N. J. (1988a). Guidelines for alleviating the effects of forestry operations on raptors 2. Wedge-tailed eagle *Aquila audax*. *Australasian Raptor Association News.* 9: 7-10.

Mooney, N. J. (1988b). Efficiency of fixed-wing aircraft for surveying eagle nest. *Australasian Raptor Association News*. 9(2): 28-30.

Mooney, N. J. (1998). Conservation of wedge-tailed eagles in Tasmania - The blunderbuss approach. in Australian Raptor Studies II, RAOU Monograph 3.

Mooney, N and Holdsworth, M., 1991. The Effects of Disturbance on Nesting of Wedge-tailed Eagles (*Aquila audax fleayi*) in Tasmania. Tasforests, Dec. 1991, Vol. 3, pp 15-31

Mooney, N. J. and Taylor, R. J. (1996). Value of nest site protection in ameliorating the effects of forestry operations on wedge-tailed eagles in Tasmania. in Eds Birds, D. M., Varanid, D. E. and Negro, J. J. *Raptors in Human Landscapes: Adaptions to Built and Cultivated Environments*. Academic Press, London.

State Biodiversity Committee, 2002. Tasmania's Nature Conservation Strategy 2002 – 2006. Final Report to the Tasmanian Government.

Terry, T. (1996). Competition between wedge-tailed eagles and white-bellied sea-eagles for nests. *Australian Raptor Association News* 17 (1): 22-23.

Threatened Species Strategy 2000. Parks and Wildlife Service, Tasmania

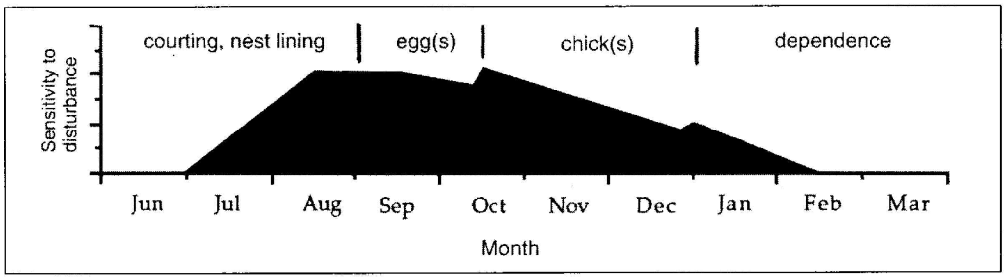

Figure 1. The sensitivity of Wedge-tailed Eagles to disturbance while breeding (from Mooney and Holdsworth 1991).

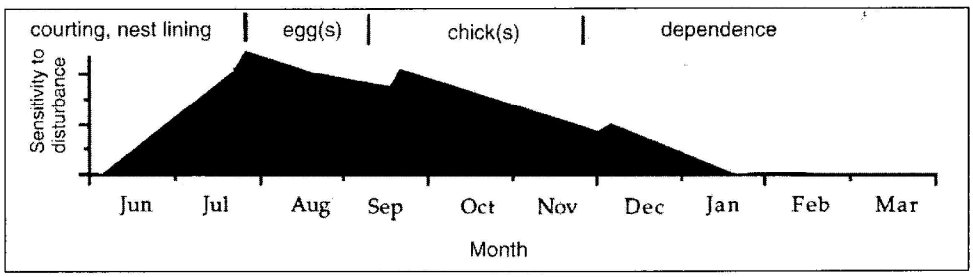

Figure 2. The sensitivity of White-bellied Sea-eagles to disturbance while breeding (modified from Mooney and Holdsworth 1991).

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APPENDIX 1:

Eagle Nest Activity Assessment Form

NB: Ground assessments are to be conducted in early September and mid November
Ground assessments are NOT to be conducted if the weather is extreme.
Minimum observer distance from an active nest is 50m at all times.
Time within 200m of the nest not to exceed 1 hour, of which only a maximum of 20 minutes may be spent within 100m of the nest.

Nest Number:	**Species:**	**Date:**

Observer Name and Contact Details:	**Location Name:**
.....	.....
.....	.....
.....	.....
.....	
Environmental Variables Estimated Temperature: ..... Fine/Overcast/Showers (Please circle)	**Grid Reference AMG / GDA (mark datum)** digits **East:** (6) **North:** (7)

Start Time (hh:mm): :	**Finish Time** (hh:mm): :	**Duration** (hh:mm): :

Nest Description: (Write a description of what was observed, eg. indicate quality, nest composition, colour, shape, size, condition.)	**Were any of these observed on the nest?** (tick)	
.....	Green Leaves	
	Fresh (brown) sticks	
.....	White wash (droppings)	
	Prey remains	
.....	Eagle on nest or nearby	

Bird Activity Observed: (Write a description of what was observed eg. two birds soaring over the nest, bird carrying sticks)

.....

.....

.....

Human Activity Observed:

.....

.....

.....

NCB Specialist Use Only: Activity Classification					
Active		**Not in use**		**Requires confirmation**	